

Abstract

5 A method for rapidly heating an emission control device
in an engine exhaust uses excess air added to the exhaust via
an air introduction device. After an engine cold start, the
engine is operated to raise exhaust manifold temperature to a
first predetermined value by operating the engine with a lean
air-fuel ratio and retarded ignition timing. Once the exhaust
manifold reaches the predetermined temperature value, the
engine is switched to operate rich and air is added via the
10 air introduction device. The added air and rich exhaust gas
burn in the exhaust, thereby generating heat and raising
catalyst temperature even more rapidly. The rich operation
and excess air are continued until either engine airflow
increases beyond a pre-selected value, or the emission control
15 device reaches a desired temperature value. After the
emission control device reaches the desired temperature, the
engine is operated substantially around stoichiometry.
Further, a method is described for adaptively learning pump
airflow using feedback from an exhaust gas oxygen sensor.